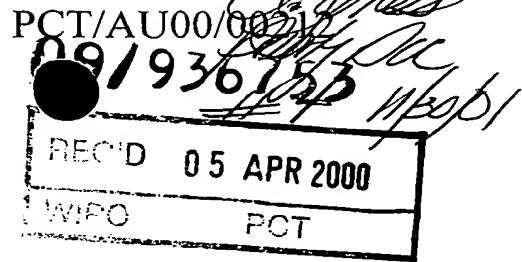


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I, KAY WARD, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PP 9267 for a patent by JAMES FRANCIS RILEY and SUSAN GAIL MCNAIR filed on 17 March 1999.



WITNESS my hand this
Twenty-ninth day of March 2000

Kay Ward

KAY WARD
TEAM LEADER EXAMINATION
SUPPORT AND SALES

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ORIGINAL

**PROVISIONAL SPECIFICATION FOR AN INVENTION
ENTITLED**

Invention Title: **SURFACE FINISHING MACHINE**
Name of Applicant: **JAMES FRANCIS RILEY and SUSAN GAIL MCNAIR**
Address for Service: **A.P.T. Patent and Trade Mark Attorneys
G.P.O. Box 772
Adelaide, S.A. 5001**

The invention is described in the following statement :

The invention disclosed herein relates to a surface finishing machine. The surface finishing machine may be used for sanding, burnishing, polishing and the like of surfaces such as timber, stone, acrylic and the like. The surface may be, amongst others, bench tops and floors. Without intending to limit the invention the application of finishing a solid surface, that is, an acrylic bench top will be used as explanatory of the invention. It will be appreciated that the invention is applicable to other applications and other surfaces.

Known finishing machines are random orbital rotating machines which typically utilise a disc. The disc may be a sanding disc, a microfine finishing disc, or buffing disc depending upon the particular application. For sanding and micro finishing large diameter discs have been tried but have tended to be unusable because of clogging with dust. Accordingly, the largest known discs are about 203 mm in diameter which seem to be relatively unaffected by clogging. However, these discs mean that the area processed at any time is relatively small and so the time taken to process a surface is relatively long. Further, the use of these discs can lead to an uneven surface unless extreme care and thus time are taken. Also, it is very difficult to use these discs without scuffing the surface which leads to extra time being spent repairing the surface.

It is also known for finishing machines to have a dust collection system. These have essentially a chassis about a mounted disc about which a partial vacuum is created for conducting dust to a collection vessel.

It is also known that finishing pads may take shapes other than circular or disc like.

It is a proposed object of this invention to provide a pad with multiple finishing areas, a disc with an aperture therethrough for dust extraction, a disc mounting plate with multiple disc mounting areas, and a surface finishing machine to obviate or minimise at least one of the aforementioned problems, or at least provide the public with a useful choice.

The invention may be said to reside, not necessarily in the broadest or only form, in a finishing pad with a dust extraction aperture therethrough with said aperture being adapted to align with a vacuum port of a pad mounting plate.

In a preferred form the pad is a disc. In other forms the pad may take other shapes such as rectangular.

According to one form, the pad is mountable to a mounting plate driven by a random orbital means and the plate has a vacuum port with which the pad is adapted to align thereto the aperture.

The invention may also be said to reside, again not necessarily in the broadest or only form, in a finishing pad including a plurality of finishing areas being proud of an intervening web, the pad being adapted such that dust tends to progress into the proximity of the web and may therefrom be extracted by vacuum dust extraction means.

5 In one form the pad is circular and adapted to be mountable to a mounting plate driven by a random orbital means.

In another form the pad has an aperture therethrough, is mountable to a mounting plate driven by a random orbital means and the plate has a vacuum port with which the pad is adapted to align thereto the aperture. In one form the aperture is within the web, and in
10 yet another the aperture is within a finishing area.

In one form the finishing areas are radially spaced about the centre of the pad.

The invention may also be said to reside, again not necessarily in the broadest or only form, in a mounting plate with a plurality of finishing pad mounting areas, the mounting areas being proud of intervening web portions of the mounting plate, and the
15 mounting plate being adapted to extract duct into and thereafter away from the web portions.

According to one form, the mounting plate is disc like.

In another form the mounting areas are circular and adapted to receive mounted thereto finishing discs. These discs may take known forms.

20 In one form the mounting plate has therethrough a vacuum port within the web portion for communication with dust extraction means adapted to extract dust from the web portion. In another form the mounting plate has therethrough a vacuum port within one of the mounting areas for communication with dust extraction means adapted to have mounted thereto a finishing pad with an aperture therethrough adapted to align with the
25 vacuum port and thereby being adapted to extract dust from the vicinity of the said mounting area. In yet a further form, the mounting plate has channels within at least one of the mounting areas extending from the web portion and adapted to conduct dust from the vicinity of the said mounting area to the web portion for extraction therefrom.

In one form the mounting areas are radially spaced about the centre of the mounting plate.
30

The invention may also be said to reside in a surface finishing machine including either the before mentioned finishing pad or the before mentioned mounting plate and random orbital drive means adapted to drive the finishing pad or mounting plate.

In one form the machine includes vacuum port means and connection means adapted to facilitate vacuum dust extraction.

To assist in the understanding of the invention a preferred embodiment will now be described with reference to the accompanying drawings:

- 5 Figure 1 is a perspective sketch of a surface finishing machine;
- Figure 2 is a perspective sketch in cut away form of the machine with motor not drawn;
- Figure 3 is a cross sectional sketch of the machine with the motor not drawn.
- 10 Figure 4 is a perspective sketch in cut away form of the chassis;
- Figure 5 is a disassembled view of the transmission train from motor boss to base plate;
- Figure 6 is a perspective sketch of the disc mounting plate;
- Figure 7 is a plan view of the disc mounting plate; and,
- 15 Figure 8 is a line sketch of a perspective view of a disc mounting area.
- Figure 9 is a perspective sketch of a second embodiment of the disc mounting plate viewed from beneath, and
- Figure 10 is a perspective sketch of a third embodiment of the disc mounting plate viewed from beneath
- 20 It will be appreciated that the accompanying drawings are sketches and not engineering design drawings. The intention is to assist understanding of the invention and so perspective or features may be distorted or omitted for clarity. Throughout the drawings the same reference numeral will be used to refer to the same or similar feature.
- 25 The surface finishing machine depicted in the figures is of configuration for finishing a bench top. The machine (1) has a chassis (2) upon which is mounted a 550 W electric motor (3) which operates at 1450 rpm. Extending from the chassis is a handle (4) with a vacuum connection (5) at one end for connection with a vacuum dust extraction system. The handle is tubular and provides a conduit from within and beneath the chassis and the vacuum system. Also extending from the chassis are two legs (6 and 7) by which the machine may be rested in an upright configuration upon a flat surface thereby allowing access to the mounting plate for disc changing.
- 30

The machine has an overall width of about 400 mm and can finish about a 360 mm wide portion of a surface at one time. The large width means that a surface can be finished more quickly than when using prior known machines. Further, the width reduces the tendency of unevenness in the finished surface so reducing the time needed

5 to ensure levelness. The weight of the machine is about 25 Kg which means that the weight of the machine is sufficient to press the finishing discs against the surface for correct operation. There is no need for an operator to press the machine against the surface and therefore the risk of scuffing is significantly reduced.

The chassis is made of aluminium and is shaped to fit about and skirt the mounting

10 plate and attached mechanism leaving the discs extending beyond the chassis. In this way the chassis forms a shroud that facilitates dust collection and extraction.

Within the chassis is a mounting plate (8) which is mounted to a foam rubber disc (9) which in turn is mounted to a fibre board disc (10). The rubber disc is about 7 mm

15 thick and provides a resilient backing for the mounting plate whilst the fibre board disc is about 9 mm thick and provides a rigid support therefor. The fibre board is mounted to a base plate (11) of steel the diameter of which is less than that of the fibre board to reduce overall machine weight. The fibre board disc acts to extend the diameter of the base plate without adding significant weight to the machine.

The base plate is mounted by bearing centre (12), bearing (13), bearing retainer (14)

20 spacer (15) to main plate (16). The base plate, bearing centre, bearing, bearing retainer and spacer are offset from the centre of the main plate by 10 mm to one side. To the lower surface of the main plate is mounted a crescent shaped counter weight (17), of mass and dimensions to counter balance the offset suspended assembly of base plate and mounting plate and associated parts. The main plate is mounted to the rotor of the

25 motor by boss (18).

Upon the upper surface of the fibre board disc proximal to its perimeter is an annular ring (19) of urethane which substantially acts as a seal with the chassis. The partial vacuum for dust extraction is created within the ring.

From the above it will be appreciated that the electric motor drives the main plate at

30 1450 rpm under normal conditions. The offset mounting of the base plate means that it and its suspended parts orbit the main plate by an eccentric motion of 20 mm from circular. This motion together with the bearing means that the base plate and the suspended parts rotate in a random orbital manner depending upon the surface and experienced load.

The mounting plate, fibre board and rubber discs have aligned apertures therethrough with form vacuum ports (two shown as 20 an 21). These are within the ring and communicate with the vacuum extraction system.

The mounting plate is made of urethane and is resiliently flexible. It has four radially spaced finishing pad mounting areas (one shown as 22) spaced about its centre each 180 mm in diameter. The pad mounting areas are circular in shape and adapted to have mounted thereto by use of velcro finishing discs. The pad mounting areas are proud of the mounting plate by 3 mm interspaced by web portions (23). Within the pad mounting areas are channels (one shown as 24) 1 mm deep between the vacuum port and the web portion for conducting dust either to the vacuum port through the pad mounting areas or to the intervening web portion and thence to a vacuum port therein. The vacuum port within the pad mounting areas are in this embodiment proximal to the perimeter of the mounting plate where centrifugal force will tend to move dust.

A second embodiment of the mounting plate is illustrated in Figure 9. This mounting plate is of similar construction as that shown in Figure 6, except that no channels are provided. The vacuum port within the pad mounting area is positioned further away from the periphery of the pad mounting area, than that shown for the first embodiment. This is preferred to alleviate the problem of the sanding discs lifting at about that area as a result of the lack of sufficient surface adhesion. This embodiment of the mounting plate is useful where sanding discs are to be attached to the mounting plate by the use of an adhesive rather than velcro. Sanding discs used in the first embodiment tend to conform to the shape of the pad mounting area under the influence of the vacuum, however certain sanding pads currently on the market are particularly rigid and will not do so. The second embodiment of the mounting plate can then be used.

A third embodiment of the mounting plate is illustrated in Figure 10. This mounting plate is very similar in construction to the mounting plate shown in Figure 6. The primary differences are that there are less channels, and that the vacuum port within the pad mounting area is positioned further away from the periphery of the pad mounting area. These modifications are preferred where there are difficulties in providing sufficient adhesion for the pad to stay on the mounting plate during use.

To the pad mounting areas may be mounted standard 180 mm (6 inch) discs that are commonly available within Australia and in at least some overseas countries. These discs, it is intended, will be available with an aperture therethrough to align with the vacuum port within the pad mounting area. Alternatively, it is a relatively simple matter to cut a suitable aperture through a prior known disc. Such apertures are not required with polishing or buffing discs where dust is not created to any extent.

It will be appreciated that due to currently available discs it is preferred to mount separate discs to the pad mounting areas. However, it is envisaged that discs may be made to cover the whole mounting plate whilst providing for operation as hereinbefore explained.

5 It will also be appreciated that with an appropriate handle the machine just described can be converted to be used for floor operation with the operator being able to stand during use.

Other variations to the just described embodiment will be apparent to the skilled addressee including the provision of pad mounting areas spaced about two or more 10 rings about the centre of the mounting plate thereby allowing a greater area to be finished at any time.

It will be appreciated that this disclosure is not intended to limit the invention to preferred embodiments or details thereof. It is intended to give an overview of the invention as conceived the details of which, at time of writing, are still being 15 investigated.

Dated this 17th day of March 1999

20 JAMES FRANCIS RILEY and
SUSAN GAIL MCNAIR
By their Patent Attorneys,
A. P. T. Patent and Trade Mark Attorneys

25

FIGURE 1

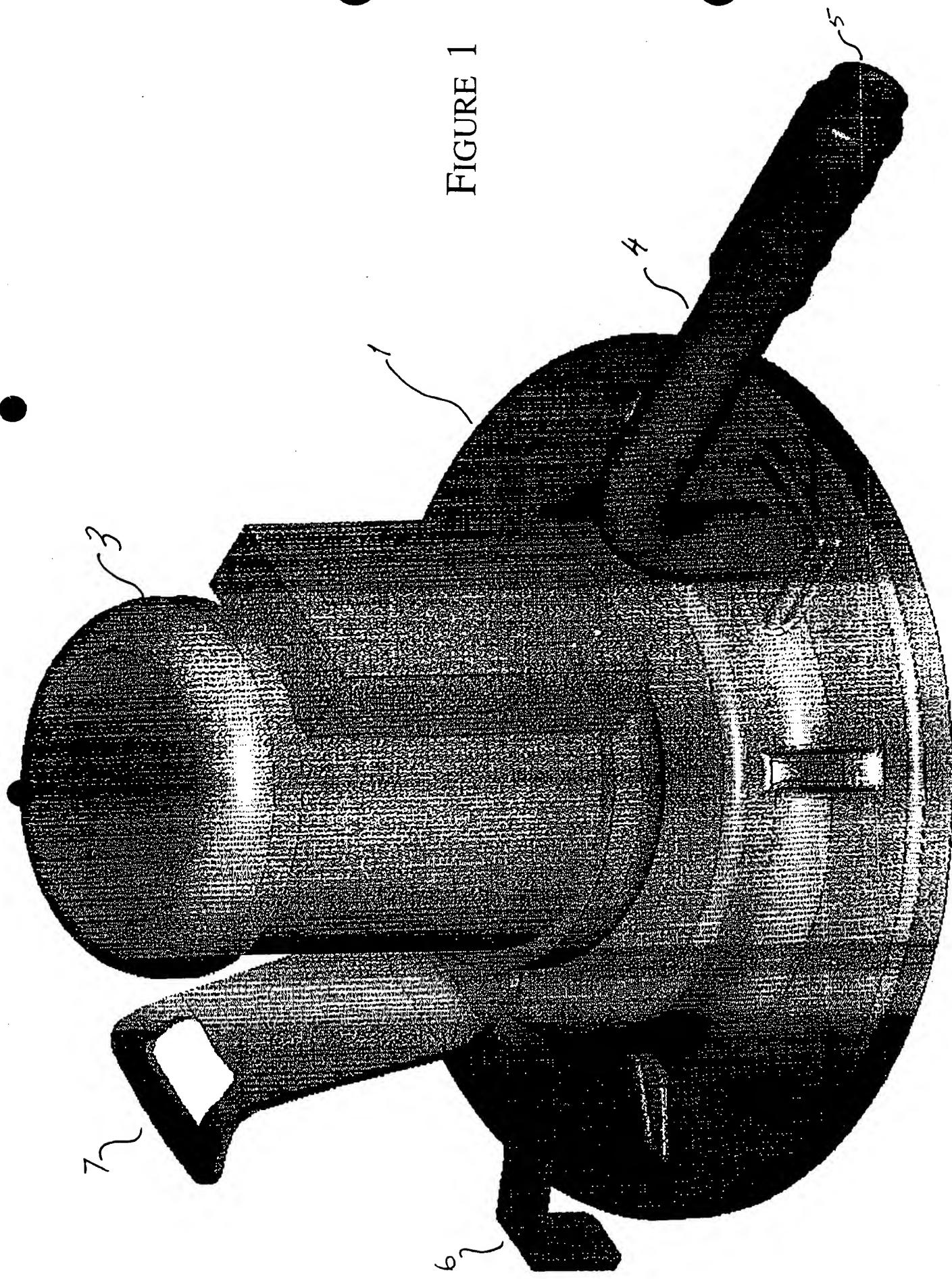


FIGURE 2

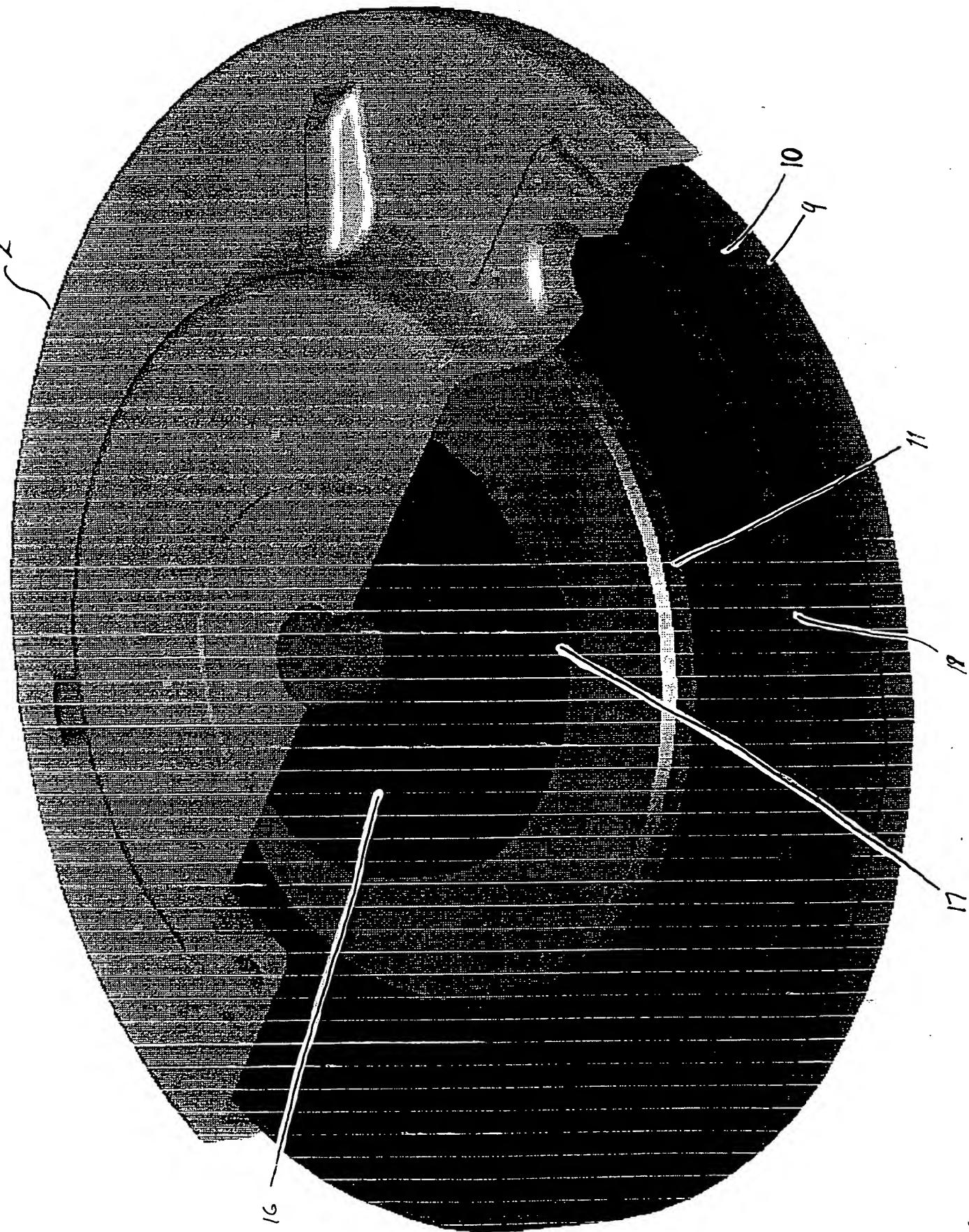
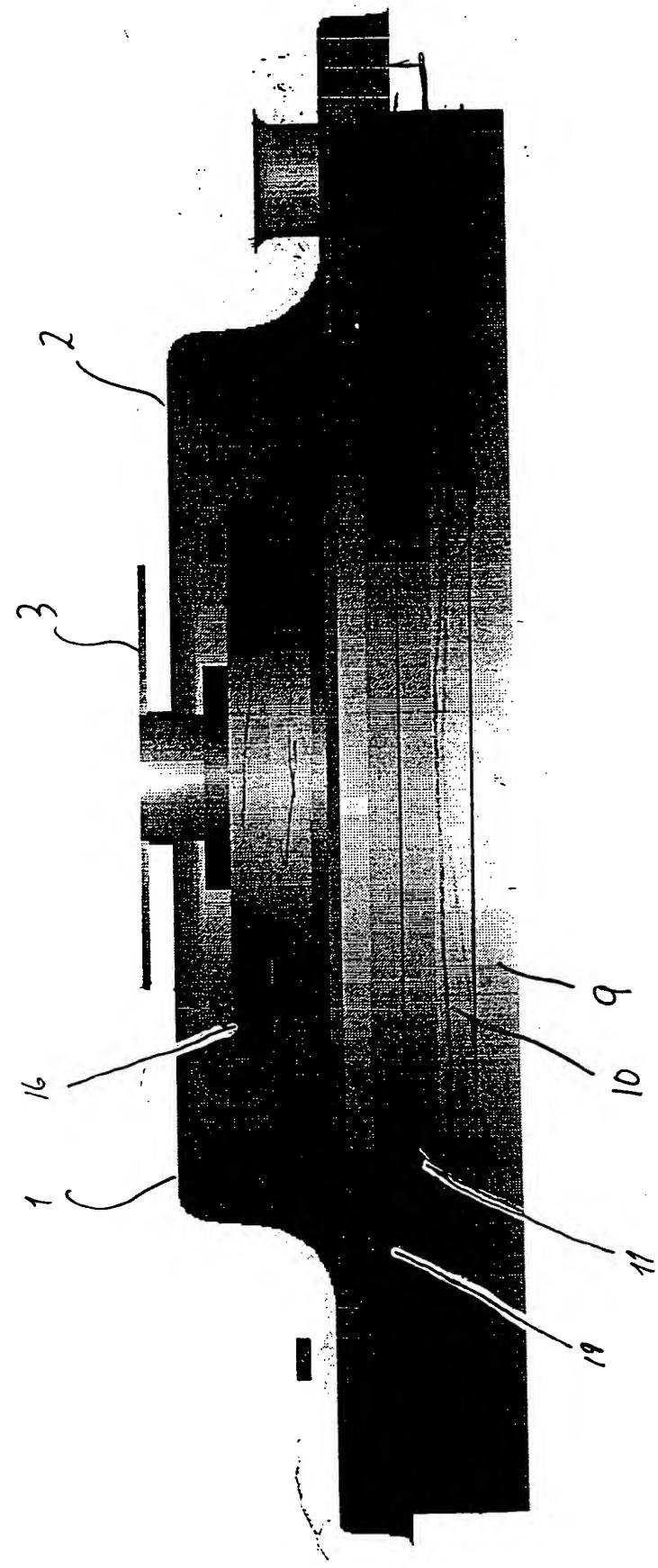


FIGURE 3



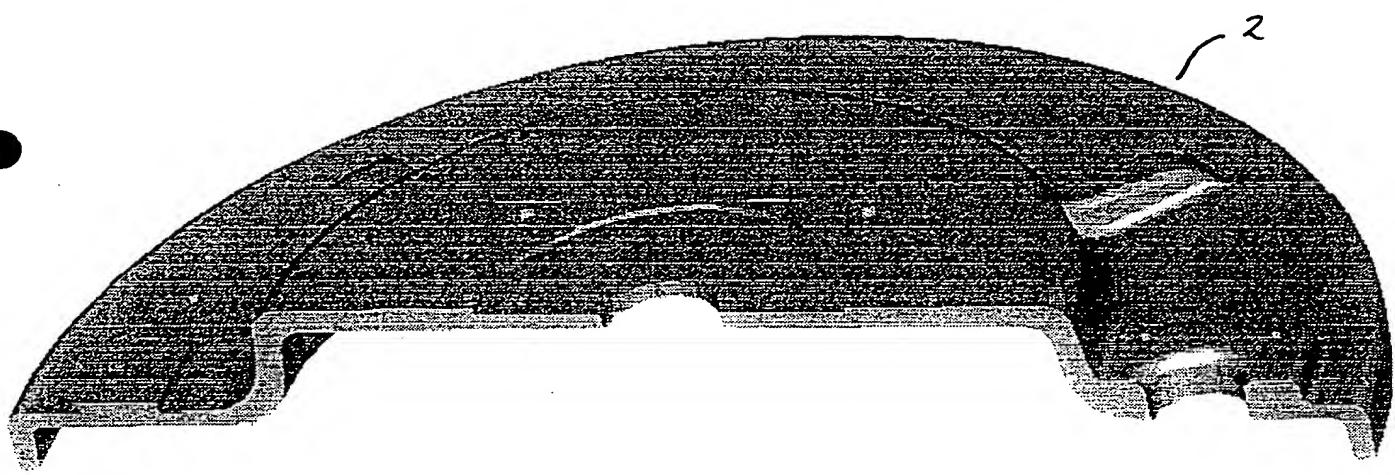
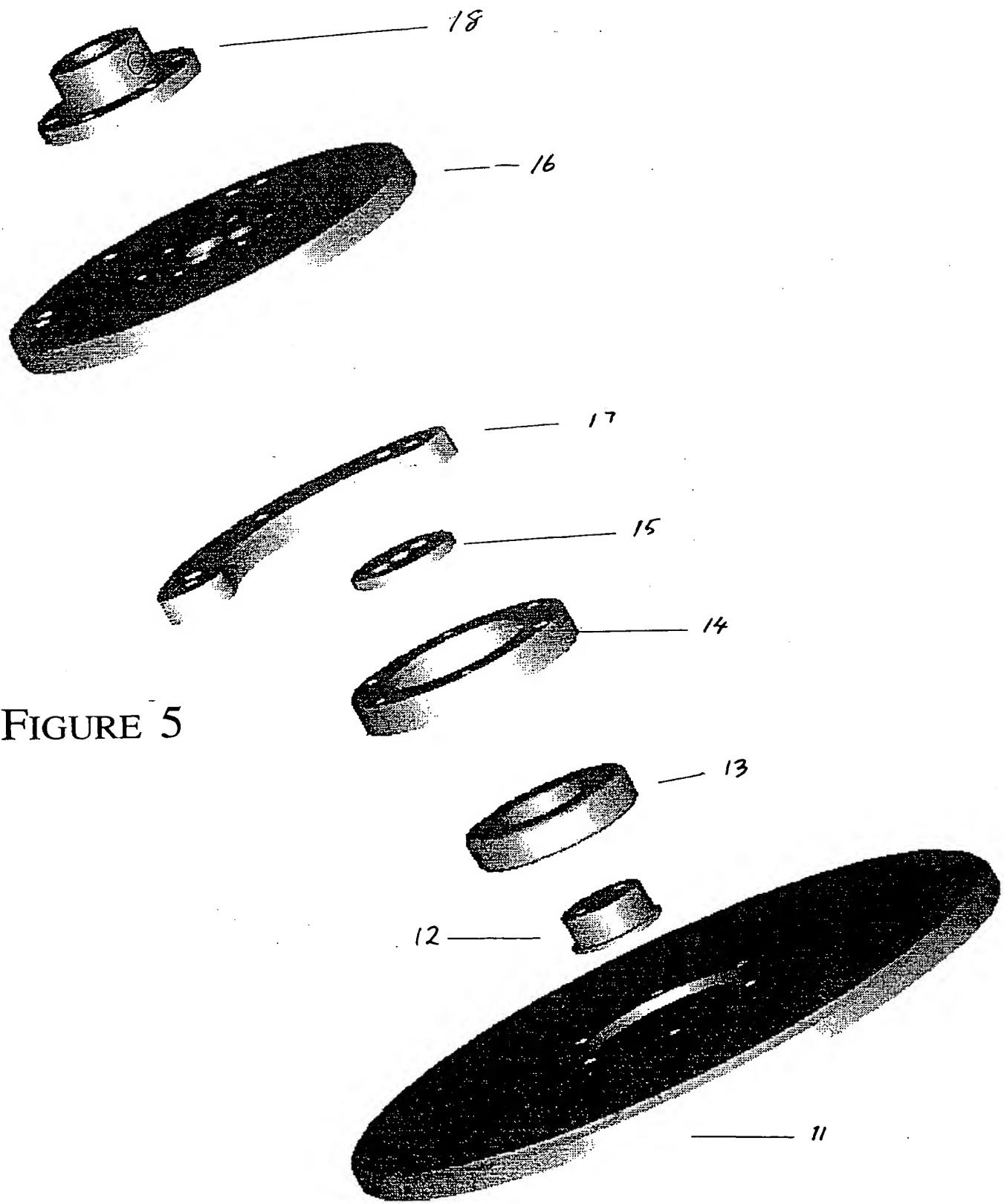


FIGURE 4



● FIGURE 5

FIGURE 6

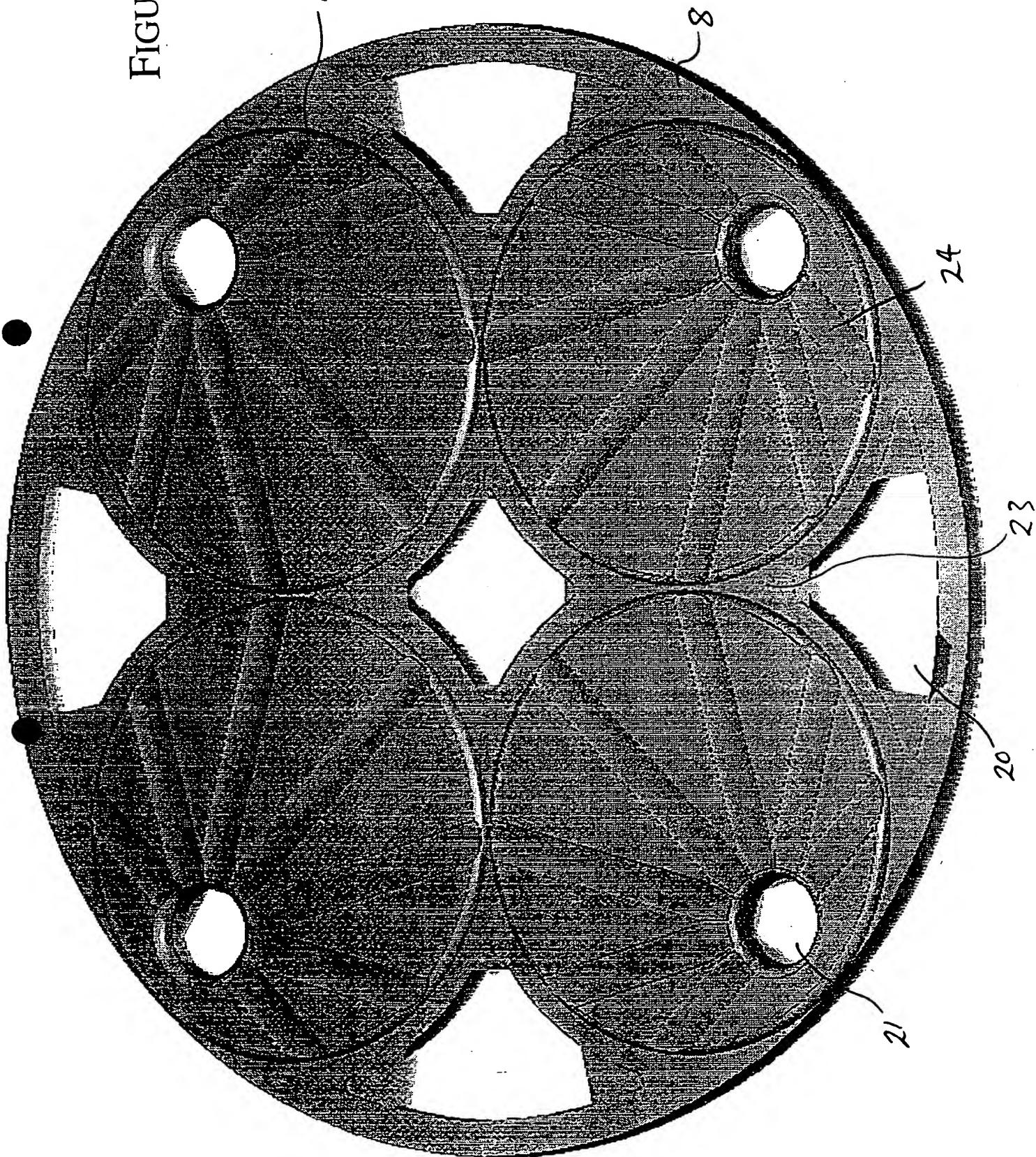


FIGURE 7

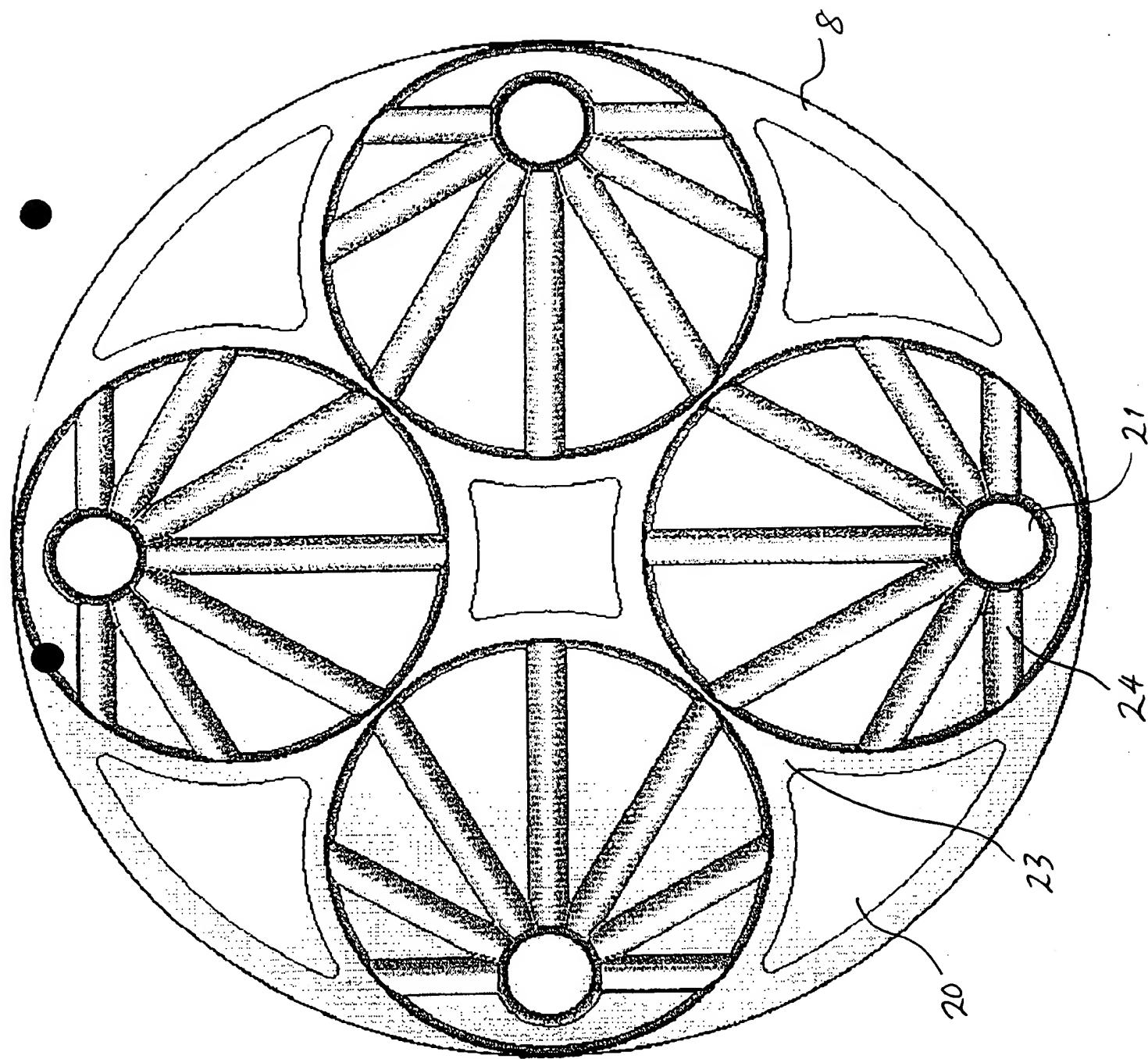
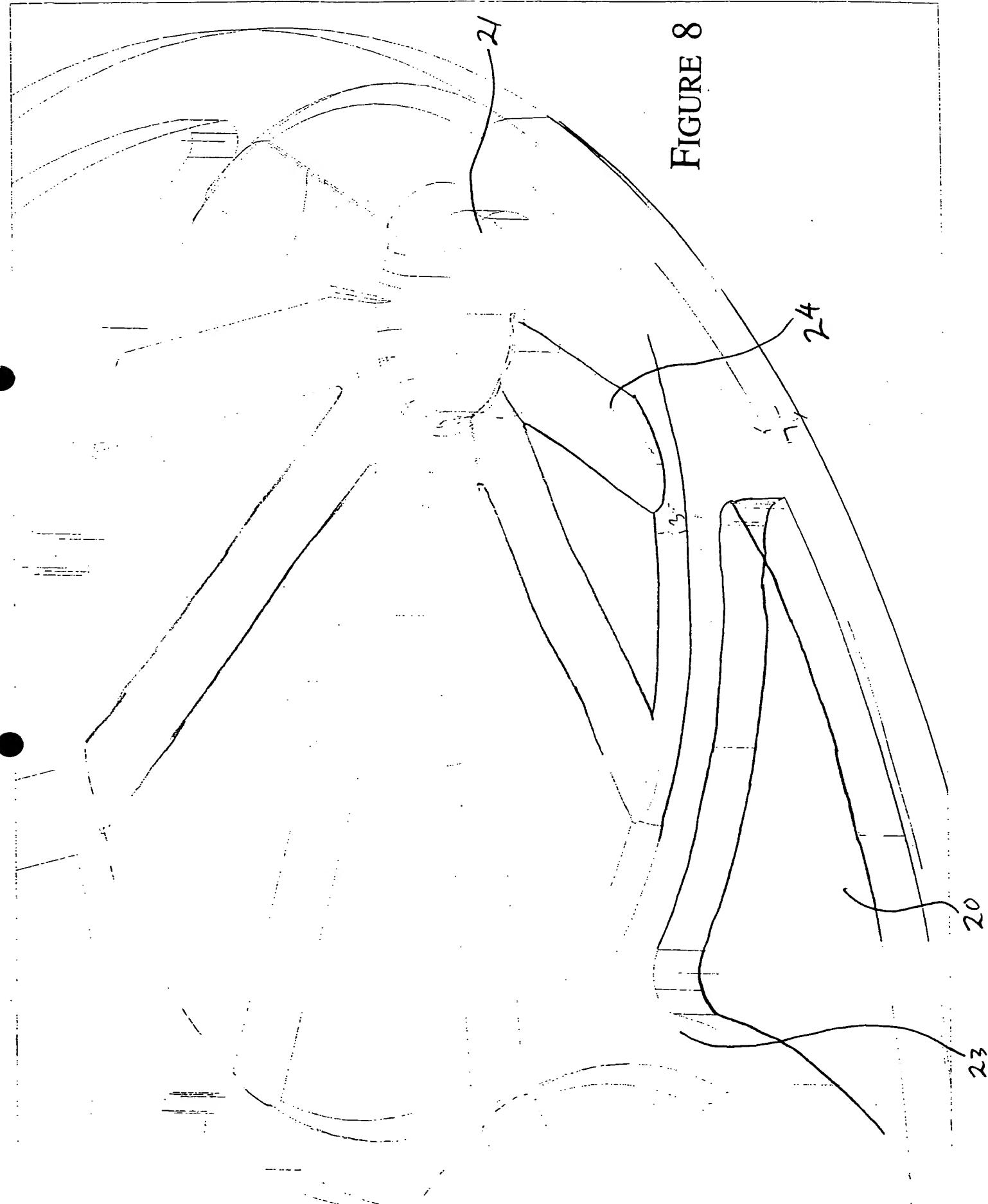


FIGURE 8



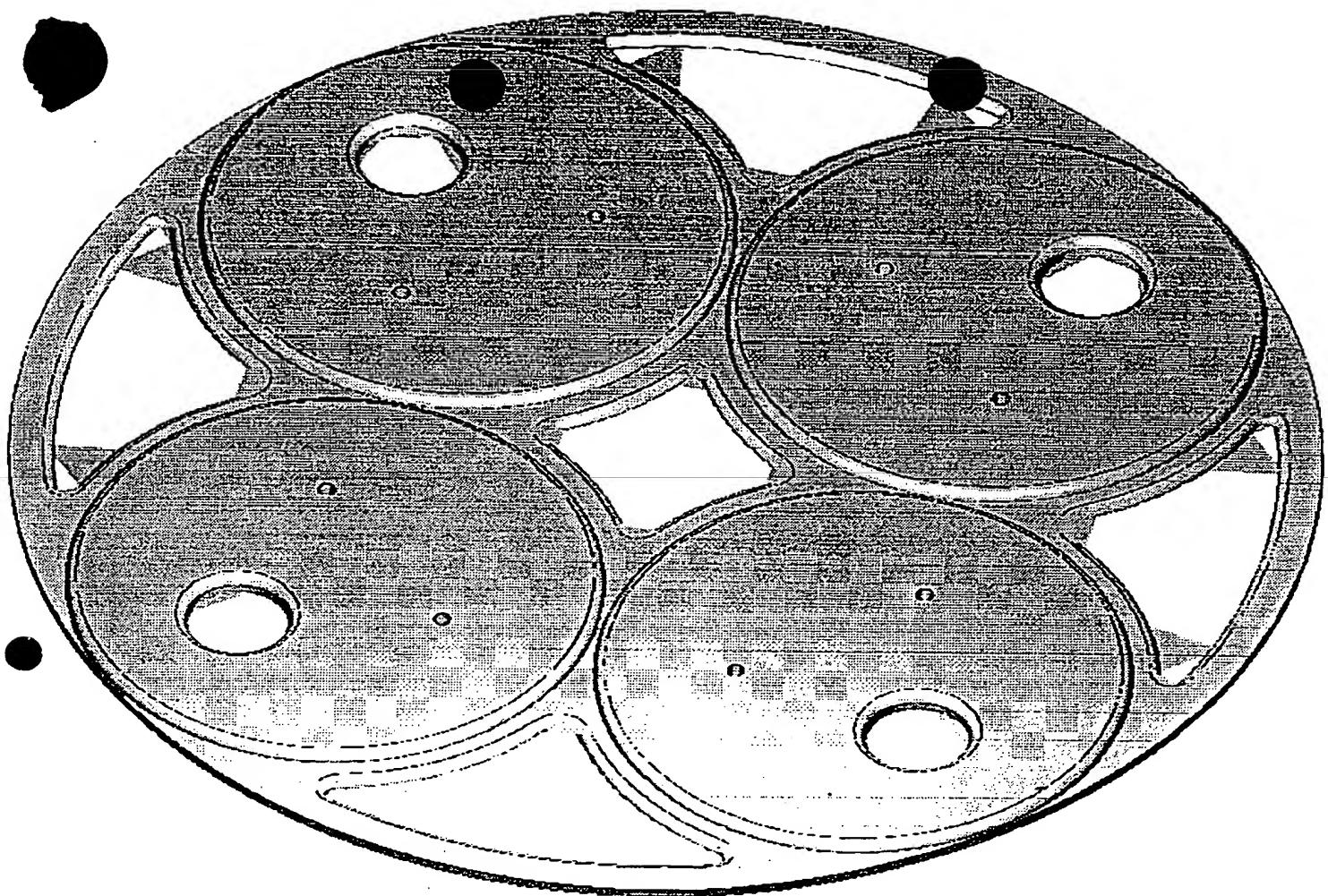
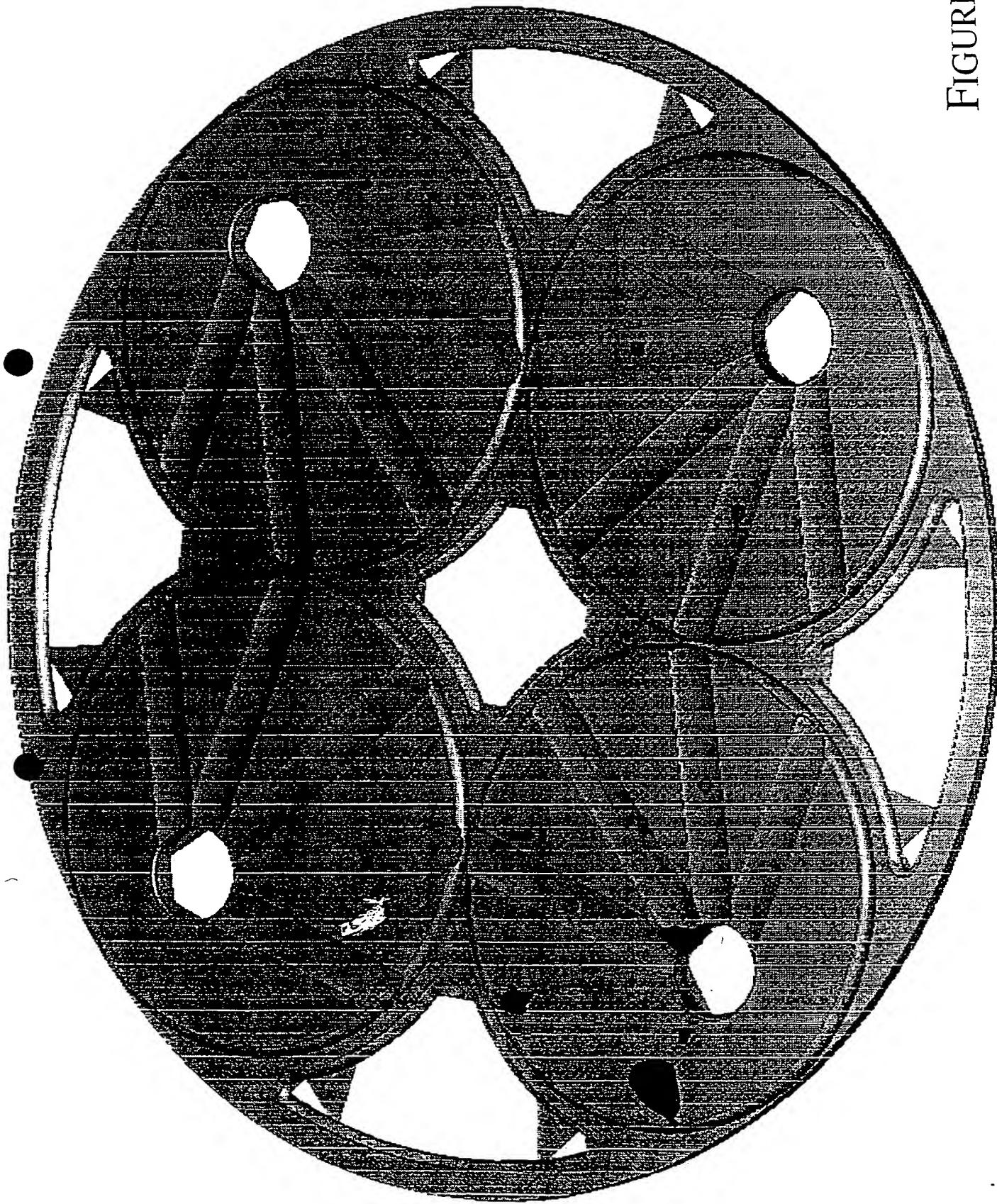


FIGURE 9

FIGURE 10



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